

— THE —

FOREST TREE PLANTER'S MANUAL.



EIGHTH EDITION.

By J. O. BARRETT,
SECRETARY OF THE ASSOCIATION,
MINNEAPOLIS, MINN.

Published by the MINNESOTA STATE FORESTRY ASSOCIATION, in
accordance with an act of the Legislature, approved
April 21, 1891, for free distribution to
any citizen of Minnesota.

MINNEAPOLIS:
THE PROGRESSIVE AGE.
1892.



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C. M. PRATT, G. T. & P. A.,
Minneapolis, Minn.

W. H. TRUESDALE,
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THE OUTLOOK.

His Excellency, Hon. Knute Nelson, Governor of Minnesota:

DEAR SIR.—In the act that furnishes the State Forestry Association with the “sinews of war,” occurs this passage:

“For the Minnesota Forestry Association, to be expended by said association for the promotion and encouragement of raising forest trees on the open prairie, for the free distribution of forest seeds and plants to such citizens of the state as will follow its instructions, for the gleaning of facts in relation to the extent and damage done by forest fires, and the effects of devastation upon our water systems and agricultural industries, for the projection of practical methods by which to prevent and extinguish such fires, and by which also to revive the growth of young timber trees on the denuded, non-agricultural sections of the state, and in the preparation, publication and free distribution throughout the state of new editions of the “Forest Tree Planter’s Manual” together with other forestry literature, containing plain and concise information for the people upon practical forestry, and in the payment of actual necessary expenses of the officers, three thousand dollars (\$3,000).”

Herculean indeed is the task assigned us; but the co-operative interest your Excellency has exhibited and that of the legislators who determined the association of twenty years standing shall live to perform its beneficent mission, together with that of the many friends over the state who have stayed up our hands when weary in, but not of, our work, give us new courage to persevere until we have conquered even a climate.

EXPENSE ACCOUNT.

Election of Officers, Feb. 3, 1891.

Feb. 3, 1891, Forestry Association by funds
in treasury\$ 131.93

EXPENSE.

March 19 to April 25, 1891, postage, circulars,
letter heads, etc., ...\$ 54.93
April 25, 1891, labor services six months, ... 77.00
\$ 131.93 \$ 131.93

Aug. 1, 1891, Forestry Association by legis-
lature appropriation.....\$1500.00

EXPENSE.

Aug. 10, 1891, printing circulars, ...	\$ 8.00
Aug. 17, 1891, personal labor, ...	50.00
Aug. 17, 1891, postage, ...	10.00
Aug. 19, 1891, Harrison & Smith printing 5,000 copies Forest Tree Planter's Manual, ..	75.00
Sept. 1, 1891, personal labor during August,	100.00
Nov. 2, 1891, personal labor September and October, ...	150.00
Nov. 2, 1891, Co-operative Printing Co., circulars, ...	3.00
Dec. 2, 1891, personal labor during November,	100.00
Jan. 1, 1892, personal labor during December,	100.00
Jan. 5, 1892, attending American Forestry Association, Washington, D. C., ...	60.00
Jan. 8, 1892, postage, ...	15.00
Feb. 3, 1892, personal labor during January,	100.00
Feb. 3, 1892, circulars, ...	6.50
March 1, 1892, personal labor during Feb- ruary, ...	100.00
April 1, 1892, personal labor during March,	100.00
April 1, 1892, postage, ...	15.00
May 4, 1892, personal labor during April, ...	100.00
May 19, 1892, 500 letter heads and envelopes,	17.50
June 7, 1892, personal labor during May, ...	100.00
July 8, 1892, personal labor during June, ...	100.00
July 8, 1892, postage, ...	20.00
July 12, 1892, L. H. Wilcox, attending com- mittee meetings, ...	14.85
July 13, postage, 1892, ...	20.00
Aug. 1, 1892, personal labor during July, ...	100.00
	\$1479.85
Balance in Treasury, ...	20.15
	\$1500.00 \$1500.00

Average personal expense per month for the 18 months,
commencing Feb. 3, 1891 and ending Aug. 1, 1892, \$70.95.

SUMMARY OF WORK DONE.

During the 18 months ending the 1st fiscal year, 10,000 of the two editions of the Forest Tree Planter's Manual were issued and circulated over the State; the same were printed in the reports of the State Agricultural Society, and a special forestry edition in the annual of the Farmers' Institute, all of which, including the forestry department under my charge in the report of the State Horticultural Society, and other forestry pamphlets donated by Prof. W. H. S. Cleveland and Prof. B. F. Fernow, Chief of the Forestry Division of the Department of Agriculture at Washington, D. C., amount to over 50,000 copies freely distributed by mail and other methods.

With our membership fees we were enabled to distribute larger quantities of evergreen plants and deciduous seeds to various parts of the State, the reports of which thus far received indicate a general success in their growing and doing well.

It is due to credit to add, that The Progressive Age, Farm, Stock and Home and Northwestern Agriculturist, all published in Minneapolis, and Northwestern Farmer, St. Paul, have allowed me special departments in their columns in all their issues for instruction in practical forestry, thus reaching through these and other channels, weekly, monthly and semi-monthly, 500,000 readers.

The dailies of the Two Cities and weeklies of the country have generously allowed my forestry articles to be published in their columns. Without exception they have exhibited an unfaltering co-operation in the work to which I have devoted all my time and energies.

GROWTH OF FORESTRY SENTIMENT.

With comparatively but little means in hand, antagonized by parties ignorant of our objects, our association has patiently battled away and now stands on vantage ground. In state conventions two political parties of our state this year planked the claims of forestry in their platforms, helping us to quite an extent. The other parties are certain to follow example, making the movement non-partisan, where it has ever stood. Farmers, lumbermen, and other business and professional citizens, are earnestly demanding the establishment of a more economic system of forestry. The antagonists of it, as in other states, are beginning to discover that the movement is of great and practical importance to perpetuate our lumber interests, conserve our waters, protect our crops and secure healthful conditions and beautiful environments for all our people.

With high respect, Yours for the Trees,

J. O. BARRETT,
Secretary State Forestry Association.

OFFICERS OF FORESTRY ASSOCIATION, 1892.

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 J. F. WILLIAMS, ... St. Paul, ... Treasurer.
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**SUGGESTIONS TO THE LUMBERMEN OF THE
 UNITED STATES IN BEHALF OF MORE
 RATIONAL FOREST MANAGEMENT.**

BY PROF. B. F. FERNOW, CHIEF OF THE FORESTRY DIVISION OF
 THE AGRICULTURAL DEPARTMENT.

The forestry problem which has now been agitated for more than a decade, should interest no one more than the lumbermen, who rely upon the forest resources for their business and yet they have appeared apathetic, if not inimical to the movement. The problem briefly stated is, how to use our forest wealth so as not to impair its future, how to cut the timber so as not to prevent the reproduction of valuable aftergrowth. It is conceded by those who plead for a more rational treatment of our forests, that the lumber business is not only a legitimate and one of the most important industries, but that from those engaged in this business nothing may be expected in the way of improved and conservative methods that does not yield a profit and that an immediate one. It may also be conceded that the present economic conditions, which surround the development of our forest resources prohibit in many cases a profitable change from the wasteful methods prevailing at least by those lumbermen, who depend for their supply upon purchase of stumpage and do not buy and hold large tracts of

forest land, which they propose to work for continuous supplies and which could advantageously be devoted to continuous forest management. Perhaps our population is not yet dense enough, our virgin supplies not yet sufficiently reduced to make such forest management profitable except under exceptional conditions. On the other hand it will be conceded that the community has an interest in the perpetuity and conservative use of our forest resources and preservation of favorable forest conditions and also that our present treatment of the same is detrimental to this communal interest, when thousands of square miles are not only culled wastefully of their best timber, but burned over and reduced to wastes, or grow up to useless brush. The question is how can the two interests be adjusted, namely, the lumberman's pocket interest, which necessitates or seems to necessitate his wasteful practices, and the communal interest which ought to prompt more conservative use. The object of this Circular is to show to lumbermen that the two interests, which seemed to have been considered inimical, are in fact identical in many ways and how at the present juncture lumbermen may assist in adjusting them.

SUPPLY AND DEMAND.

That it is proper time now to consider the question of future supplies may be inferred from the following rough estimate such as alone is possible with our present statistical knowledge. We use, in the U. S. (by rough estimates based upon census and other figures) over 22,000,000,000 cu. ft. of wood annually. Of this enormous amount (about 350 cu. ft. per capita) over $4\frac{1}{2}$ billion cu. ft. round of the best timber are made into lumber; (between 30 and 40 billion ft. B. M.); railroad construction requires round 500,000,000 cu. ft.; fencing takes an annual amount, but by far the largest consumption is for firewood. An uncertain amount is burned up every year in the conflagrations, which rage especially over the western mountain country which swells the total consumption probably beyond 25,000,000,000 cu. ft. of wood annually. During the last three decades an increase of round 30 per cent in consumption for each decade is indicated. The area covered with wood growth is less than 500,000,000 acres. If the land area not known to be treeless or in farm were under forest, the acreage would not exceed 850,000,000 acres, but the lower figure is probably more nearly correct.

From the careful statistics of German government and private forests we know that the annual growth of wood per acre and year does not average more than 55 cu. ft. (It may under favorable conditions with some species rise as high as double that amount.) In this yield branches and smaller dimensions down to 3 inches diameter which are not used in this country, are included. If we refer only to the production

of such sizes as are used in this country, there would be, at the age of 125 years, found at best to have grown not more than 35 cu. ft. per acre per year. Our present acreage, therefore, even if it were well stocked and well managed could not produce our annual consumption. But we know that much of it is badly stocked, occupied with poor timber and not cared for; we are consuming, therefore, much more, probably double, what the area produces, and with every year the disproportion grows. Were we to assume 10,000 feet B. M. now to be standing on every acre of the whole forest area,—an extravagant estimate even with the enormous stumpage of the Pacific Coast forests—our area could not supply our needs for much over 100 years, which time it takes to produce a good sized log. Most of the timber we are now cutting is over 200 years old. The probabilities are that the end will be visible much sooner. For the White Pine the end (not absolute but relatively speaking) is now in sight; the same for Walnut, for Yellow Poplar and Ash. Hence attention to more careful and more thorough utilization and especially prevention of unnecessary waste is indicated even from the pocket interests of the lumberman.

FIRE LEGISLATION.

The most harmful avoidable waste comes from losses by fire. Not only are enormous quantities of timber killed or deteriorated in value by the annual conflagrations, but by burning the leaf mould and seedlings, the ground is made barren and given over to inferior vegetation and scrubs, and desirable reforestation is prevented. It would be in the interest of both lumbermen and communities to stop this waste.

This Circular, therefore, appeals to lumbermen not only to enjoin their own men to more careful use of fire, but to be instrumental especially by associated effort in bringing about the enactment and enforcement of proper fire legislation. There is no reason why forest property should not be as well protected by the community as any other property and it will be protected if the owners insist.

Following is the draft of a bill which can be applied more or less modified according to circumstances in every State, its main features having been drawn from the law enacted for the State of Maine in 1891 and there successfully applied. The writer would lay special stress upon the necessity of having the enforcement of the law under an officer specially charged with and responsible for it. There is in several States in existence satisfactory fire legislation, except that it lacks the proper machinery to enforce its application.

PUBLIC TIMBERLANDS.

There is one other immediately attainable, practical and desirable step possible toward improvement of existing condi-

tions. It is a change in the methods employed in the disposal of the public timberlands.

Under present regulations lumbermen and most *bona fide* consumers can secure public timber only by circumvention, direct or indirect, of the law. As a consequence fraud and trespass, wasteful cutting, illegal acquisition of lands and material, destruction by fire and abuse of the administration if it attempted to execute the law, have been the rule.

The management of this part of the public domain, has been denounced as unsatisfactory by every administration for the last 30 years, without securing legislative redress.

A tentative change was inaugurated by the law of March 3, 1891, which gave power to the President to reserve timberlands for forest purposes. [Here the author mentions the acres reserved, under President Harrison's administration.] It is desirable that this policy be extended to the effect of withdrawing all public timberlands from disposal by sale or entry and substituting disposal of stumpage by licenses under certain regulations somewhat similar to the Canadian systems, providing at the same time for a rational method of protection and eventually of a regulated forest management.

In such legislation the needs of the resident population as well as of the lumber business must be duly considered and the *onus* of protecting the property against destruction and devastation placed where it belongs, namely, upon the government, which representing the community, must be responsible for all interests of the future. To aid in the protection against fire and trespass, the army might be used, a measure which has been most successfully employed in the National Parks.

FUTURE LUMBER INTERESTS.

It would appear that this method of protecting the communal interest in forests would be at the same time advantageous to the future of the lumber business. All lumbermen, therefore, interested in those sections of the country where public timberlands are situated and especially all lumbermen's associations should be concerned in the passage of such legislation by which in part at least their own pocket interest and that of the community are harmonized, and an example of what rational forest management contemplates may be established for imitation by private forest owners.

A wash for trees is made as follows: Dissolve one pound of copperas in two quarts of boiling water. Add this to a pail of ordinary lime whitewash. This will cause it to thicken. Add a handful of common salt; thin with water. The wash is now ready to apply at any time by not allowing it to dry up. Apply to trunk of trees in May and June to keep out borers; in fall to keep off rabbits. Applied last of January or first of February will prevent sun scald.

UTILITY WITH BEAUTY.

Millions upon millions of forest seeds fall upon the ground, scattered hither and thither by the winds, few of which will ever take root. Not one person in a thousand has ever thought of gathering them for planting and culture or for the market. The time is coming when the harvesting of such will be a paying business; and our business is to develop it. Our seeds are wanted in the South, but the seeds of the South are not wanted by us. Climatic conditions inhere with the germ, and are transmissible. It has been repeatedly demonstrated that northern grown seeds for northern planting, are the hardiest and most reliable.

Every farmer should have a tree nursery of his own. Economy is thrift. With right treatment, he thus has the best of seedlings at the least cost. No farmer should think of raising a crop of cereals or vegetables without a crop of trees to protect them and furnish them with humus and moisture. On an average, from year to year, a forest-protected crop gives at least a quarter more yield than one raised with equal culture on the open, wind-swept prairie.

METHOD OF PLANTING SEEDS.

Do you propose to have a tree nursery? All right. Of course you have the seed on hand. Is your ground plowed deep, say ten or twelve inches, and pulverized fine as for corn? All right again. Sow them in long drills so you can use the cultivator and save time. Cover the box elder, the ash, the maple about an inch; three-quarters is safe. When the basswood seeds are ripe, gather them sure, for the tree is very valuable for honey and manufacturing purposes. It will grace the lawn, fringe the waters with beauty and sweetness, and be an Eden tree in the wood-lot. We ought to raise this tree all over the Northwest by the thousands and millions. Sow them just as soon as gathered and between rows of box elders to shade and succor them when young and tender. Serve the maples the same. The "fittest" then, is what we need—the basswood, the maple, the oak, the butternut, the hickory, the walnut, the pine and other evergreens. The nut seeds may be safely planted in November, where they are wanted for a perpetual legacy to home and country. Plant, say, eight feet apart, between rows of box elders for shelter, which can be removed when the precious candidates are strong enough to support themselves. Cover the nuts about two inches. Seeds designed to be kept over winter should have a dry, cool place. Some sand mixed in will be a "savor of life."

BUY THE RELIABLE.

If from necessity you have to buy seedlings, buy of reliable nurserymen who raise them in the Northwest. The nearer home the better. Select one-year-old trees; they do better. Where you ship in from far distances, the trees are liable to heat, and then you lose them and your money too. The cheapest is the best, though it cost a little more. In our dry climate spring planting is safer than fall planting.

HEALING IN AND PLANTING.

But buy in the fall and ship in immediately, so that your plants can be ready early in the spring and in the best condition. When in hand, select a well drained spot; dig a trench, say, six or more inches deep, according to the size of the plants; throw the dirt back on a slant, cut the bands without fail, lest the trees may heat; spread thin in the trench; sift in dirt fine and snug to the roots; throw on more dirt and press it down gently; pour in water if the ground is dry; fill up, and thus you have another trench for the next instalment, all in shingle fashion. Cover thin on the tops. Now your plants are safe and the broken points of the roots will be partly healed over in the spring.

When the ground is warmed up and moist, plant the trees well down and press down gently but effectually. Cultivate briskly until the middle of July and let the cells ripen up for the winter ordeal. The weeds will trap the snow and otherwise protect your plants

NATURAL GROUPINGS.

Most all of us have made a mistake in putting our trees in squares and blocks like a city. This is stiff, artificial, unnatural, unseemly. Mountains lie in clusters and curves; so do the valleys; so do the clouds move and the rivers, and this is why they are picturesque. Let us copy nature in landscape architecture. Plant our trees on the more waste places, on the sides and crests of the hills, along the windings of the brooks and rivers and lakes. Curve them where they will look best, where we can have gaps to see through to what is beyond, where we can have large spaces for the fields and orchards and gardens, where our crops can be protected, breaking the wind at different points. Draw about the buildings the brightest birches, the cleanest elders, the most golden willows, the most symmetrical evergreens, the hardiest and most beautiful shrubs and vines and flowers, arranged in natural groupings, climbing over stones and walls and trellises. The useful thus becomes more useful for its natural beauty and home-like environment.

EVERGREENS FOR SHELTER BELTS.

Nothing is more beautiful and home-like than evergreens on the lawn. They should be planted also around the stock yard, the barn and other out buildings to serve as protection and hide deformities. They may be planted here and there through the orchard with very great advantage.

SCREENS.

Among the hardy sort of evergreens are the Scotch and Austrian pines, the Norway spruce, Douglass spruce and our own native white spruce, common red cedar and arbor vitæ, also our white and red pines, and the jack and bull pines. A single row of these trees, mixed for variety and mutual support, will afford much protection from the winds in a few years; but two or three rows are far more effective. Do not set them too near the orchard; give room for the ample ventilation to the apple and plum trees; two rods are not as serviceable as three, and four rods are better. Alternate them, *quin cunc*, so that every tree shall be opposite the space in the next row. Plant them eight or ten feet apart.

HEDGES.

Do not set them close to the shelter belts, especially if allowed to grow high. Put them at least two rods outside the shelter belt.

MOST RELIABLE.

Evergreens from the wild forest are not as well rooted as those from the nursery; but they can be made to live with proper care in plucking up, packing and planting. In no case should they be allowed to dry the least. Keep the roots moist; never expose them to the sun or wind for a moment. Drying coagulates the juices, forms a gum, stops the circulation.

TIME TO PLANT.

Always in the spring; don't wait till the trees are growing; take them up and replant before the buds have largely swelled.

RIGHT SELECTION.

You want fine trees for the future; then be content with small ones, those that are three or four years old. They cost less and stand better chances to live than larger ones, and will soon overtake the large. This rule applies to all trees we plant and righteously care for. Your best is from the nursery that have been at least twice transplanted.

PLANTING.

Spread the roots out natural and do it quick; press the fresh soil in close; have the plant at least put down one inch deeper than it grew in the nursery; water well at first if the ground is dry; leave a film of unpressed dirt on the surface; avoid putting any mulch in the hole, but spread on the surface out from the trunk; never dig deep among the roots of your trees; keep out weeds and binding grass. Your duty well done, the Great Gardener will give you sunshine and rain, and you will have "treasures laid up in Heaven," for you have improved the healthfulness and beauty of the world we now live in.

EVERGREEN SEED.

Frequent inquiry is made how to raise evergreens from seed; and the statement generally is that the effort is a failure. It is indeed a thankless task unless one has the facilities and plenty of time for management. Prof. S. B. Green, of our Experiment Station, St. Anthony Park, makes a success of it, because he makes it a business and knows how. I herewith summarize his method for the benefit of those who would like to try. It pays a fellow to see the little things "bopeep," and grow under our fostering care.

1. Use a rotten, dry, sand-leaf mould for a seed bed.
2. Select a location for the bed away from woods or places where mice and squirrels abound. These depredators like such seed.
3. Sow the seed broadcast and sift on a covering of about an inch for the hardy evergreens, having large seeds such as the pines and the Norway spruce.
4. Arrange so you can shade at pleasure. Raise up the side boards about six feet for free circulation of air. Use willow brush or laths for shading. If laths, then nail about two inches apart, and shade north and south, so the shadows will pass east and west on the beds. Protect thus from the sun in very bright or long continued sunny weather both in summer and winter. After ordinary rains take off the shades, and not put on again until the bed is well dried off.
5. The greatest danger is when the plants are young and growing fast, especially when the weather is warm and moist.
6. "The damping of evergreens in the seed bed may be greatly reduced, if not entirely prevented, by covering the seed bed with sand or other mulch.

Think of the millions upon millions of valuable tree seeds that men pay no attention to and treat them as of no use. What is wanted, is the reforestation of a continent and nature is proffering the means without money and without price. The resurrection of a Republic sentiment is coming, and close to the doors, when we'll accept these inestimable bounties and profit by them.

HEALTHFULNESS OF TREES.

In the beautiful process by which the hydrogen of water is wrested from the embrace of oxygen, "sending it kiting into the atmosphere for a new flirtation and inviting the carbon into the nuptial bower," if the acid of the carbon, through which develops the carbo-hydrates, is not sufficiently refined and vitalized in the laboratories of decay and thence of advanced animal and vegetable life, the water and ammonia supplied are so many dead weights hanging upon the plant. No chemical transactions then occurs to any healthful extent, and the plant starves amid apparent luxuries. Trees, more especially their lung leaves, serve as alembics through which such acids are distilled, fitting them for the growth of food plants and healthful conditions of atmosphere. The chemical transformation, under the electric force of sunrays, "that organize the carbo-hydrates by the meeting of carbon dioxide and water in the chlorophyll of the leaves and other growing tissues, is an atmospheric purifier," and, therefore, an antidote to germ diseases. In this "chemistry of nature" trees are more potent agents of health than other vegetations, so demonstrated by experimentation. That atmosphere, then, is not best fitted for blood vitalization where forests are wanting. The sudden reaction of high hot winds into low cold winds—always occurring on treeless plains—have the same effect upon us as upon our food plants. These atmospheric perils can never be forestalled or greatly mitigated, except by the intervention of dense forests and the chemical changes here defined.

CLIMATIC SANITATION.

By the agency of trees we have more equability of climate, which can be obtained by no other way. They keep the ground healthfully cool in mid-summer by obstructing the heat rays; by their millions upon millions of leaves they filter and vitalize moisture and exhale it upon the air properly prepared for us to breathe; by their roots they take up for growth vast amounts of stagnant water, which otherwise would breed pestilences; by nitrificative processes they aid in the introduction of oxygen into the soil for healthful aeration to plant and animal life; by evaporation they produce a salubriously cool and moist atmosphere, forestalling chills incident to rapid radiation of heat.

Biederman's *Ceniralblatt*, a German review, affirms that, "Wooded districts are not troubled with smoke, injurious vapors, or germs and bacteria that are found in towns. The innumerable leaves and branches of a forest in a manner filter the air, and retain the micro-organisms which floats in the lower grounds; besides woods cut the cold and dry winds, so dangerous to the organs of respiration and render the temperature more uniform." By scientific experiments on heat radiation,

Prof. Tyndall demonstrated that were it not for an invisible gaseous envelopment with its moisture surrounding the earth, largely evolved by forests, "it would long ago have radiated its heat to an extent totally destructive to every living organism."

THE CIRCULATORY SYSTEM.

What the lungs are to the body, the forests are to the country we live in. Dating our rainfall at the highest, averaging 28 inches, six inches at least is wasted in destructive floods. In round numbers this would amount to 100,000,000 gallons per square mile of surface lost to food plants, lost to the people of the towns and cities whose water necessities are constantly augmenting. The forested ground covered with leaves does not freeze as readily, nor so deep as that of the treeless prairie. Hence, ordinarily, more water can be absorbed and retained in the forests. In the open country snow melts before the ground is thawed out, and that, too, at a season when the atmosphere is considerably saturated with moisture, preventing evaporation to an extent. Then we have our usual spring waste of water; and in summer, when the ground is baked hard, a large per cent of heavy showers run off from our fields and gardens. During the late fall, winter and early spring months, including that of heavy showers in the heated season, water enough is wasted, which, if properly economized, would feed all our plants for healthy growth, and our streams and wells. If we would have paying crops and plenty of water to drink and utilize for mechanical industries, we must copy nature's method, plant wide, dense belts of trees around the slopes and edges of all our hills, our lakes, our rivers, our gullies and sloughs, and build dams where feasible, and dig underground reservoirs where these facilities are wanting, thus saving what runs off to irrigate our fields.

UNSANITARY DREGS.

But there is a sanitary virtue here involved of immeasurable worth. The sand and pebbles purify our surface waters where they flow, more especially if large in amount. Forests constitute the circulatory system. They drain stagnant water, and send it back into the air to fall in showers. Their great roots penetrate into the retentive clays, opening channels into veins and cavities, where the water is sipped up by capillation, thus draining large areas of surrounding soil and husbanding it for economic use. Thus the death rate is greatly lessened in the towns and cities. Physicians tell us more than 80 per cent of the typhoid cases are produced by drinking impure water. Sickneses keep pace with the ruin of our forests and loss of our flowing waters. As they become more stagnant in the river troughs, so must we drink of unsanitary dregs. What is the sequence? Poor crops and general ill-health.

DURABILITY OF TIMBER.

With much rotting of timber and fence posts, there is a necessity of cutting large amounts of wood, involving faster deforestation, to say nothing of the vexation and loss by extra labor. Various expedients are suggested and employed that often prove injurious to the timber's preservation. Sometimes men paint green or badly seasoned wood, and thus hasten rather than prevent decay. We must understand that the decay of wood is traceable to the fermentation of the sap, probably a growth of bacteria or fungi. To forestall such results, the sap in the wood must be dissolved or dried out, thus preventing moisture from entering again. Timber will not rot if kept absolutely dry, or entirely submerged in water. It will be noticed that wood decays the faster on the side that lies on the ground. The looser, moister and warmer the soil, the more rapid is the decay. Dry rot obtains in woods that have no or poor ventilation; observable in white patches at first that change into brown or gray. A drying-out process, good ventilation and isolation from moisture will remedy this unhealthy condition. Heart-wood is more durable than sap-wood; but season the sap-wood and the difference disappears. Generally the heavier woods are the more durable.

TIME OF FELLING.

The time of felling has much to do with the durability. Early winter, say in December, when there is the least fermentable sap, has the preference. Then the timber will season with less care, more slowly and evenly. If you cut the wood "in the sap," of course fermentation occurs, inviting the attacks of insects, and necessitating more care in seasoning. A rapid seasoning produces an outside seasoning which creates a sort of coating that envelopes an unseasoned interior, thus evoking a "heart decay," so to speak. If you cut the tree in the leaf, let it lie at full length until the leaves are withered, say two or three weeks, before cutting to size.

CHECKING.

Removing the bark from the felled trees aids the seasoning process, but not in the standing tree. The peeled log will season faster if lifted from the ground on blocks. Shield it as much as possible from sun and rain in some dry, airy place. Wood is very apt to warp and split if dried too rapidly; then the cracks collect moisture, inviting more rapid decay. Checking or cracking of logs may be prevented by coating the ends with oils. Covering them with linen cloth and paper so as to lessen evaporation will be a help. Side-cracks should be filled with tow or cotton. Slow seasoning is the safest. Twelve or

eighteen months will do for most purposes; but for special work, from two to ten years is required.

"The best method of obtaining proper seasoning without costly apparatus in shorter time, is to immerse the prepared timber in water, from one to three weeks, to dissolve the fermentable matter nearest the surface. This is best done in running water; if such is not at hand, a bath may be substituted, the water of which needs frequent change. Timber so treated, like raft-timber, will season more quickly and is known to be more durable.

"If practicable the application of boiling water or steam is an advantage in leeching out the sap.

"Good coatings consist of oily or resinous substances which makes a smooth coat, capable of being uniformly applied; they must cover every part, must not crack, and possess a certain amount of plasticity after drying.

"Coal-tar, with or without sand or plaster or pitch, especially if mixed with oil of turpentine and applied hot (thus penetrating more deeply), answers best. A mixture of three parts coal-tar and one part clean unsalted grease, to prevent the tar from drying until it has had time to fill the minute pores, is recommended. One barrel of coal-tar (\$3 to \$4 per barrel) will cover 300 posts. Wood-tar is not serviceable because it will not dry.

"Oil paints are next in value. Boiled linseed oil or any other drying vegetable—not animal—oils, are used with lead or any other body (like pulverized charcoal) to give substance. Immersion in crude petroleum is also recommended.

"Charring of those parts which come into contact with the ground can be considered only as an imperfect preservative unless a considerable layer of charcoal is formed, and if it is not carefully done, the effect is often detrimental, as the process both weakens the timber and produces cracks, thus exposing the interior to ferments."

Practically our lumber interests are under the control of three or four large capitalistic corporations. It is estimated that not over 25,000,000 feet of standing pines are now owned by lumbermen outside of these corporations.

The pine timber still left is variously estimated, conservative men put it at 13,000,000,000 in the several districts. The exact cut of lumber in 1892 was 1,344,000 feet. The number of men employed in the woods was 17,472. This year, 1893, the number of hands is increased to over 19,000.

Soon the average cut per year will be 2,000,000,000 feet. It will be seen then that our pines cannot last longer than about the close of the present century. Any one, who has an interest in the welfare of the next generation, cannot but be pained at the contemplation of the on-look. Shall we, or shall we not, reforest our State with timber trees where absolutely needed?

OUR PARKS.

Parks are perpetual institutions. While they answer as protection against the blighting effects of hot and cold winds and help in promoting humidity to a great extent, they are rural resorts and breathing places in summer, and instrumentalities of social amenities. The merry meetings under the embowered shades enable us to throw off care and recuperate for greater victories in the battle of life. Once popularize the park enterprise, and farmers, now so isolated and estranged from each other, will soon discover that the farm is not profitably managed nor fit to live on and by, until feasible spots are covered with trees and vines and flowering scrubs. The new environments will invite neighbors, and a fellow feeling be evoked not yet realized in farm life. The transformation of some of the acres into beautiful parks will naturally develop the social loves of our being, giving a "silver lining" to every cloud of disappointment and care. A park—what is more attractive for children to play in, and the old folks to sit in, and the water springs to gurggle in, and the birds to sing in, as if they, too, could

"Read my title clear to mansions in the skies?"

Our large cities are giving special attention to parks. They are found to be sources of public healthfulness and refinement of ideals that naturally embody themselves in corresponding character. Why should not our country towns and rural neighborhoods follow the example, and even excel the cities in artistic arrangement where landscape variegation warrants?

ITASKA STATE PARK.

Through the instrumentality of Hon. J. B. Sanborn, of St. Paul, Congress has relegated to Minnesota, in round numbers, 20,000 acres for a State Park, beautifully located at the head waters of the Mississippi. It is in a wild and enchanted region, and will soon be of great value to the public as a place of resort when properly improved and enlarged.

STATE SYSTEM OF PARKS.

There is a plan under consideration to abrogate the tax certificate system under whose provisions unpaid tax lands can be bought up by individuals for speculative purposes. The design is this: If the original owner does not redeem his land within the specified legal time, said lands are to be relegated to the town, county or state under specialized conditions, to be thenceafter consecrated to tree growing, as parks to all practical purposes, the profits of which accrue to the rightful proprietors for the payment of costs and further purchases and improvements. This would establish a park system on a grand scale, inductive to the further conservation of our forests.

FOREST FIRES.

Look at the burnt districts where thousands upon thousands of acres of valuable timber are utterly ruined, the very ground literally fire-eaten, leaving nothing thereon but leafless, black stubs of trees with scrubby poplars and tangling briars! People do deplore such calamities, lumbermen especially, but nothing is done to avert them. It is indeed saddening to witness the ruin wrought. Who sets these fires? Not the lumbermen, but some hunters and poachers are largely responsible, and homesteaders, too. A settler wants to clear his "felled piece." He waits till the stuff is well dried. He touches the combustible with a match and away the fire-fiend flies on ruin bent, till millions of valuable property, and not a few homes and lives, are destroyed. If this is not murder in the first degree, what is it? And some people look on, completely dazed, feeling a sense of superstitious awe, and are habitually if not religiously opposed to any interfering with the ways of providence to punish folks for their sins!

PROPOSED REMEDIES.

We have so large a territory of woodland, most of which is sparsely settled up, any attempt to master the forest fires seems to many impracticable. But greater victories than these have been achieved in our age of progress. When such fires are in full headway, it is next to impossible to arrest them. Prevention is the best remedy. It is not to be expected that all fires will be prevented; but it is certain that with vigilant attention to the matter, they can be at least reduced to a minimum. Men prowling through the woods in the dry seasons, having no interests at stake, are careless with the camp fires and their pipes. A severe law is absolutely necessary that will force strict guard over the forest property, compelling careless hunters, fishers, and every other class of wanderers and settlers to obey governmental orders. The Forestry Association tried hard to induce the late legislature to enact some such law initiatory to protection against the careless or wanton setting of fires to our woodlands, but the matter was allowed to go by default. The result shows the necessity of educating the masses up to a practical comprehension of the situation. The Canadian government has quite a successful law in operation, respecting forest fires, so has New York, Maine, Pennsylvania and some other States. Minnesota needs one more perhaps than some of the prairie States. It is to be hoped that something will be done at our next legislature.

A SOLDIER FORCE.

If we must have soldiers to keep the peace, why not in the a time of peace put them to the most practical use? A test of this kind has already been made in the Yellowstone and other

parks of the mountainous west, and it has proved an admirable success. A large portion of our woodland territory still remains a public domain. Under the Reserve System now in agitation in our State, as well as elsewhere, such a police could have full control of the forests in times of danger. Strips of land could be burned off or otherwise cleared of combustible stuff, connecting bodies of water, thus limiting the spread of fires within special areas. Highways could be built on the section lines and kept clean from dry grass. Careless men in the woods would be on their guard when they know armed soldiers are patrolling over the territory to arrest the guilty party.

In Scandinavia and other parts of Europe, forest fires are rare exceptions, while with us of "free America" it is a rule of sheer abandon. It is certain that lumbermen, railroad men and others having investments in timberlands, are ready to co-operate with any movement under governmental management, that is equal or even partially equal to the necessity of the situation.

THE GREAT LESSON OF AGRICULTURAL CHEMISTRY.

By way of an apology for forest, and prairie fires, too, or better perhaps to fortify the stolid indifference of men who do not care what becomes of the next generation, the argument is used that fires improve the soil! Quoting Liebig, who, eminent and honest as he was, jumped to a false conclusion, they say, "Ashes represent the whole nourishment which vegetables receive from the soil;" that, if manures, or the forest leaves and fallen limbs, or the prairie grasses, are burned, "nature is aided in her process of vegetable reconstruction." But it has been repeatedly demonstrated by our later chemists, that burning the covering to the soil, whether it be the forest floor or dressing to the farm, neutralizes the nitrogen process of transformation into plant life educed by moisture and decay; that they cause an undue volatilization of ammonia from the soil, escaping into the air; that this dissipation, if long continued, changes the soil into desert conditions, followed by a retrograde installment of trees and other vegetation, and thence the loss of our springs, rivers and lakes. Fires are the finishing touches of ruin, and the desert is the next presiding demon whose fury we have invoked by our customary vandalism. The Farmers' Institute annual cites to the experiments of Lawes and Gilbert:

"The *ashes* of fourteen tons of barnyard manure were applied for thirty years in succession on the same acre, and produced each year only two bushels of wheat more than the continuously unmanured acre. The artificial mineral manures were also used in the same way on another plot, and with the same result."

THE FOREST COVER.

Practical farmers are learning the superior advantages of mulching, or keeping their soil covered with something that

will retain the moisture, and thus contribute to the evolution of ammonial properties for plant growth. So with the forest; it is a vast, ammonia-brewing cover, and its soil is thereafter rich, as its great trees prove. The forest makes the soil. In the providential order of things, there is no source of wealth and of life support in all the world that compares with the forest: And yet men slay it without a thought of reforestation; they let the fires pave the way to impoverishment of agriculture, to the extinction of our water systems, to the absolute extinction of the lumber industry in the near future.

WATER RESERVOIRS.

The upper Minnesota river, generally dries up during August and September; in the latter part of October commences flowing again. Similar phenomena are no doubt occurring elsewhere in the Northwest. It is no new thing of late years. How are we to account for this intermittent action? It is traceable, doubtless, to the fact that, during the hottest part of the season, when vegetation needs the most nutrition, the greater part of the moisture is absorbed by the roots and leaves and thence reconstructed or stored up in the plants and fruits, and the balance evaporated upon our thirsty winds, thus so monopolizing the water, scarcely a drop remains in the beds of some of our once living streams and lakes. After our crops, cereals especially, are matured, no more moisture can be utilized in that direction, being no longer needed, and the evaporation is correspondingly lessened because of the lowering of the temperature. This transition from growing to harvest conditions, together with colder ground and air, enables the springs to recuperate themselves; hence they flow again.

A WATER FAMINE.

What is the inference from this data? Evidently that there is not enough water filtrating up capillarily from below the soil to supply our agricultural vegetation and at the same time keep our streams and lakes flowing when most needed. If these conclusions are correct, it follows that with larger increase of agricultural productions, we may have a water famine, as compared with our needs, and that our soil and air will become drier and drier as the years come and go, unless we early forestall such calamities.

OVERGROUND RESERVOIRS.

There is just so much water in the world, enough, doubtless, to sustain life in its civilized conditions, could it be economically utilized. With the destruction of our native forests

come destructive floods, whose waters are hurled back into the sea whence they came. Often the accumulations of a whole winter of snow and rain turned to ice are thus needlessly wasted; which if saved would be quite enough to feed our vast fields of crops. Under these calamitous circumstances which we have engendered by deforestation and want of forests where they can best serve our purpose, it is our necessity to build overground reservoirs of great dimensions, into which the spring waters from the melting snow and ice could flow, to be thence forced up to supply the people with their flocks and herds, and irrigate our fields and gardens.

DAMS FOR IRRIGATION.

Our prairie sloughs and coolies and mountain canyons can, by suitable dams, be used to hold back the wasting waters of spring for irrigation when most needed. Would we not thus be amply supplied with water far better for our purposes than artesian, which is more or less mineralized with properties illy fitted for vegetable growth? The advantages accruing would pay a thousand fold. This, with ample forests on the poorer sections, is certainly a feasible undertaking and pre-eminently practical.

GOVERNMENT RESERVOIRS.

The U. S. government has already established four reservoirs at the headwaters of the Mississippi, and nearly completed the fifth, the summary of which is as follows:

Lake Winnibigoshish:

Watershed, ...	1,422 square miles.
Water surface, ...	101,206 acres.
Storage capacity, ...	344,000,000,000 gallons.

Leech Lake:

Watershed, ...	1,225 square miles.
Water surface, ...	110,632 acres.
Storage capacity, ...	225,000,000,000 gallons.

Pokegama:

Watershed, ...	630 square miles.
Storage capacity, ...	35,000,000,000 gallons.

Pine River:

Watershed, ...	602 square miles.
Water surface, ...	15,206 acres.
Storage capacity, ...	56,000,000,000 gallons.

Sandy Lake (almost completed):

Watershed, ...	384 square miles.
Water surface, ...	7,522 acres.
Storage capacity, ...	15,600,000,000 gallons.

The lumbermen who projected the reservoir enterprise "builded wiser than they knew." The design was to benefit river driving and navigation, and in this respect it has served a

practical purpose. Fast as the wild lands are subdued for farming, so the demand for water increases, and there is not "enough to go round," without the closest economy. The time is rapidly approaching when all the tributaries to our lakes and rivers will have to be controlled and utilized for our varied industries and life supports. Then these forest reservoirs together with what our necessities may call for in the prairie regions, will also be used as feeders to a grand surface irrigation over the State.

It is obvious, however, that the reservoir system will "play out" if the present destruction of our native forests is long continued. Dense forests are nature's reservoirs; as her copyists we must obey her meteorological laws or signally fail. The native forests ruined by axes and fires, and the rest follow—ruined! Maj. W. A. Jones, in charge of these works, well says:

"The art of forestry has for its object the preservation of the old, the creation of the new. Wherever it goes, water is the vital factor."

ARE THEY NOT THE PEOPLE'S?

The popular policy of personal ownership of the forests, presuming it will the better preserve them from ax and fire, unmistakably proves to be a "losing game." Have we not tried it to our satisfaction? Do we not know that this policy not only relinquishes what is inalienable with the people, but curses the people in the long run? "Am I not king of my own ground," asks the proprietor, "and therefore have a right to do as I please with my own trees? If I will to cut them all off and burn over the young growth, whose business is but my own?" He does not stop to think even of the disaster he brings upon himself, much less thinks of others' claims and sorrows. It is so strange we of America will not profit by the fearful lessons of the Old World. Speaking of forestry in Austria and Hungary, Edmund Jessen, Consul General to Vienna, says:

"The greed of men, the desire of speedy gain without reference to consequences, the want of judgment and knowledge as to the cause and effect in the courses of nature and its developments, have razed and shorn the forests along the spurs of the Alps and the shores of the Mediterranean with the same merciless energy which has been displayed in this direction along the shores of the American rivers and on the slopes of the American mountains."

The same story is told of France. When the French revolutionists divided a large part of that then forested country among small peasant proprietors, the latter cut the trees down for money and pasturage, and for their reward and that of their

children there came the whirlwind over the ruins of their best hopes. The desert conditions that followed reduced them to absolute poverty, and those portions of land were finally abandoned. France has since expended already thirty million dollars to restore the forests, and with them comes prosperity again.

The same story is told of Germany, long since repenting of its folly; of Italy, of Switzerland, of Spain, yet in the night of her national despair because her forests are not restored, and so of all the Asiatic countries. Palestine, the sacred grounds of the Hebrew prophets, consecrated by the Christ and his apostles, Palestine, once beautiful and luxurious, was at last invaded by the ax-man and the fire-fiend, and a robber-like race took possession. The white-winged dove of the gospel found no place these to build its nest; it fled to forested lands.

AMERICANS HEED NOT THE HISTORIC LESSONS.

Americans, heedless of historic lessons, have been at work provoking like conditions. As the line of our civilization was pushed westward, the forest receded before the ax and fires; with what effect? Ask the forsaken farms of New England, for their undue sterility has a voice as from the grave of buried hopes. Ask the dry and treeless Alleghanies. Ask the ruins of the beauty of the Adirondacks. Ask the burning simoons of the western prairies. Ask the fire-scorched Rockies. Ask the parched and miasmatic beds of vanished lakes in our own Minnesota. Ask our continental Mississippi, largely robbed of its water supplies, dwindling down into a mere stream compared with what it was before the forests were so unwisely and extravagantly destroyed.

We cannot much longer continue forest vandalism and escape the woes that other nations evoked upon themselves. Nature is never mocked with impunity. There is a point on the line of monopoly which, if we pass, is death to the American Republic.

PRIVATE OWNERSHIP ABORTIVE.

There is a movement in our country, assuming partisan coloring, to transfer all the remaining public woodlands into the hands of the States where they are located, to be relegated to individual settlers. This is an unfortunate and misleading policy, abortive of the ends sought. The Paddock Bill, pending now in Congress, designed to meet the emergency of the situation, presents a summary of argumentation, the facts of which are irrefutable!

TRUTH OF EXPERIENCE.

"Experience in the United States has shown that under private ownership, forest conditions are almost invariably destroyed or deteriorated, for the simple reason that the timber

for present use is the only interest which private enterprise recognizes in the forest, not being concerned in the future or in the consequences of mismanagement to adjoining, who have to suffer.

It is therefore undesirable to transfer the ownership of the public timber lands to individual owners in the expectation of having them managed with a view to the broader interests of the community.

CONSOLIDATED AREAS NEEDED.

"If there were need of other demonstration of this point beyond the history of the eastern forest lands, which have been for many years in the hands of private owners, we need only refer back to the working of the law in the Pacific Coast States, where such disposal to private holders has utterly failed in accomplishing its object. There is neither the interest nor even the knowledge to be found among the many to let us anticipate forest management by small holders. Besides forestry thrives best on large consolidated areas, from financial as well as technical considerations.

"It will be necessary, in order to promote rational forest management, to do the same that all other nations have found necessary to do, namely, for the Government to set the example and furnish the object lesson and opportunity for the others to follow.

CONSERVATIVE ELEMENTS.

"The fact that a tree crop takes from fifty to one hundred years and more to grow to usefulness, requires a patience and stability of ownership which our people have not yet attained, and hence the Government must furnish the conservative elements where needed, as in our forest policy.

CLASHING OF INTERESTS.

"The cession of the public timber domain to the individual States with a view of having the States devise methods of conservative management, would fail in accomplishing the object for various reasons. Experience in the past with such cessions has not proved it practicable to place restrictions or conditions upon such cessions to enforce them.

Even if a cession, under condition that the State provide efficient management, could be practically effected, lack of unity in the various systems and clashing of interests where watersheds are situated in more than one State, make retention of these lands in the General Government desirable, or at least more promising of conservative results.

CO-OPERATION OF STATES.

"Other reasons of expediency make such a wholesale cession of timber lands impracticable. Among these may be

mentioned the difficulty of segregating the timber lands from public lands of other description or transferring obligations of the General Government toward railroad companies, resting upon such lands.

Nevertheless, co-operation with the State authorities in inaugurating a sound forest policy is most desirable, and should be made a prominent feature in whatever measures the General Government may devise."

THE EUROPEAN REMEDY.

"There is another subject," said Senator Paddock in his report of the Committee on Agriculture and Forestry, "not strictly agricultural and yet so closely allied to that interest as to demand consideration always when agricultural questions are under discussion. I refer to the preservation of our forest lands from denudation. Those who have investigated and given much thought to the matter declare that the wholesale destruction of the forests of a country, without providing for a new growth, not only seriously affects the material interests but impairs the health and comfort of all the inhabitants thereof. Bitter experience long ago taught the people of the Old World that they could not with safety wage indiscriminate war against their trees. Nature is, indeed, a kind mother to those who exercise an intelligent regard for her habits and her laws, but she is at times terrible in her wrath against those who blindly defy her decrees. The laying waste of the forests of a country rudely disturbs that harmony between nature's forces which must be maintained if the earth is to be kept habitable for its teeming millions.

We have ourselves heretofore sadly neglected these considerations, but our Government can not and must not much longer refuse to give to them its most serious attention. If we may not with propriety restrain the individual from injuring his own property, we can and should at least furnish information and devise plans, through intelligent legislation, which shall incite him to co-operate with his neighbors to protect their common interests. Most European Governments have elaborated methods whereby they exercise a supervisory control over the forests of their dominions, and one day the public welfare will demand that our Government shall follow their example. The subject is a practical one; it is not a dream of the theorist; it concerns the pockets of the people and their welfare in many ways."

The lumberman who wishes to deal fairly by the forest ought to be our best friend, instead of mistrusting us, for we do not seek to close the forest against him; quite the reverse, our aim is to supply a never-failing crop of timber, to the legitimate lumber trade, and, at the same time, to regulate the climate for the farmer, and save our water courses for navigation.—M. J. JOLY, Quebec, Ca.

VOICES FROM THE WOODLANDS.

"The Voice of one crying in the wilderness."

I write this while in the woodlands of the north, in quest of wood material for the World Fair. The region of cut pines extends for hundreds of miles in all directions. Like an eating cancer, the ruin wrought has deadened everything touched by ax and fire. Black stumps are left, but seldom shadowed by live trees, generally the short lived poplars occupy such ground. New trees would have sprung up and densely reclothed these lands had fires been excluded. Nature here has retrograded. The very ammonia in the soil has been burned out. Its nutrition is seriously harmed. What makes the forest real, is gone. The forest roof is broken down. The forest floor is broken up. This characterizes almost the entire woodland condition. Hence, a rapid destruction to water conservation, and the lakes and rivers in these woods are meeting the fate of the departing pines. The hardwoods, too, are doomed. Everything in the shape of a tree or a hoop pole, that can be converted into money, even if the business don't pay over fifty cents net per day, has to come down. A combustible stuff is left in the woods which the annual fire laps up, and the conflagration spreads and spreads, killing everything in its advance, leaving but here and there a green oasis in the general wreck.

This country is naturally adapted to growing the pines and valuable hardwoods; will pay larger in tree crops than in agricultural productions; and, at the same time, such woods, rightly managed, will surely preserve these head waters and thence our rivers from drying up. Common sense economy suggests that we rescue them from further vandalism. But an ugly opposition pits itself upon such an effort. Certain business men of the trust nomenclature discover that lumber profit on a vast scale is fast approaching an end, and they rush and scramble for the yet unraided pineries before less scrupulous parties from the Dominion of Canada can steal them, or greater fires devour them. Many of the owners of the timberlands are non-residents, living in the great eastern cities, and occupying the same relation to this region that the landlords of Ireland, while rioting with "wine and women" in the cities of London and Paris, do to their tenant farms.

There is another factor in the ruin going on, not so culpable in intent, which must be calculated before the forest problem can be solved. Most of the farmers who have entered claims in these woods, came here poor and remain poor. The trees have been their living. Crop raising has not paid of late years under the piratical monopoly of the markets. They have, therefore, neglected their farms for lumbering business on a small, individualistic scale, and not a few trespass upon the territory of the absent landlords. We have, then, two

classes of lumbermen—the syndicates who have capital to absorb the best and get the most, and the “poorer fry,” derisively so called by their lords, who content themselves with taking what escapes the first axes and the last fires. Looking the situation all over, woeful is the aspect, foreboding terrible disaster to our business interests, not only in the lumber line, but especially in agriculture that depends directly upon forests to break and soften the wind and frost and furnish water for crops.

THINNING OUT.

There is such a lack of good common sense in the management of utilizing these valuable woodlands! No attention is paid to economic methods of thinning out. Nowhere do the owners seem to think that trees in a compact body mutually protect each other against the death-dealing blows of excessive heat and cold winds in our climate, and that where they make great and sudden gaps among them, they are wrecking the remainder of their forests. Not over a third at the utmost of the trees should be cut at a time, and that too with wise management, that the law of mutual protection shall hold in tact.

CATTLE BROWSING.

Notwithstanding this violation of scientific forest laws, nature is at work kindly and forgivingly to repair the injury by trying to develop a new instalment of young trees, as if she sensed the peril to our water system on which we all are equally dependent. The tender things are heartily welcomed, but note again in what manner. No sooner do they peep out of the ground in the spring than the cattle in the settled sections are turned in for pasture and scarcely a shrub survives. The forest can never recover so, and we have no trees for the future years. The cattle destroy the forest floor; the soil dries up, and with it the water faster evaporates and our springs are gone, and poor crops follow. If there is blame due any body for the forest raids, the farmers are just as culpable as the professional lumbermen, for while the first take off the cream, the last spill all the skim milk.

FIFTY PER CENT LOSS.

With unwise thinning out, combined with fire and stock-browsing, it is safe to say that the forest consumption on an average in Minnesota is fifty per cent greater than the substantial growth. A decade or more of such manœuvring and the people at large may see at last that the tall living forest with a thick underbrush and water thereby conserved, are inseparable factors in the supports of life.

OUR GAME AND GAME LAWS.

Personal observation in the northern woodlands of Minnesota, has opened my eyes to sorrowful conditions other than

the ruin of our forests. During the latter part of October and the whole month of November, and so every year, the woods are full of hunters, and there is not one man in a hundred that cares the snap of his finger for the perpetuation of game to the next generation. He does not scruple to kill the last duck, the last goose, the last swan, the last pheasant, the last beaver, the last otter, the last deer, the last moose. The needs and claims of other people do not enter into his consideration. The wild Indian, ere the white man polluted him and his squaw, was always careful to retain enough of the sexes to breed from for future supplies. When he dug into a beaver's house, he was sure to leave a mated pair. In this respect he was more civilized than the pale face.

GOING WITH OUR TREES.

Our game is going with our trees. Any one who observes the situation here, can see at once that, with few exceptions, the hunters delight more in destruction than in economic preservation of animal life. The same carelessness prevails respecting our valuable fish, to have the last pike, the last bass, the last pickerel, the last brook trout. Who among the fishers and poachers think of preserving a specimen pair for the years to come? Everybody seems to be crazy-headed, feeding on greed and blood and thunder. Have we laws to protect such game? Oh, yes, but they are not vigorously enforced. Nature's vast resources of wealth and support to human life are not officered with ample authority to prevent the utter ruin of everything valuable there—timber, game and all.

But the law itself is limp. It does not meet the necessities, does not prove an antidote to the general steals and extravagances everywhere practiced. The ax, and the fire, and the hunter are fast destroying the stay of lumber business and the staff of life.

BOUNTY ILLY APPLIED.

I was told by settlers living in the woods that, while there is a bounty on the wolf, the fox and the bear, there is none on the lynx or wild cat that devours the greater proportion of the young fawns; none on the skunk or owl that devours most of the eggs and chickens of the pheasants; that if encouragement in the way of adequate bounties were proffered the hunters and settlers to kill off the latter useless beasts and birds of prey, the people would have ten times more game than they now have.

For humanity's sake will not our legislature do something to forestall the utter extinction of our wild game on which so many are dependent for a living? If we have any interest in public welfare, which includes you and me, do let us bestir ourselves to save our forests from ruin, and thereby with stringent laws enforced save our valuable game, that we all may live and not die before our time, and that we may transmit to our successors an inheritance worthy of us.

ARBOR DAY.

His Excellency, Gov. Knute Nelson, has appointed the 28th day of April for Arbor Day. He wisely correlated it with our schools where only the prevailing indifference can be overcome. It is to be hoped that all our teachers will be alive to its observance, and will thus early prepare to make it a success. As the sylvan day returns are we reminded of our needs for tree protection to our crops and our homes in association with the beautiful of vines and flowers to enliven the weary hours and give "silver lining" to every cloud of doubt and care. Our duty is plain. Let us faithfully discharge it; and let us not forget our trees after we have planted them. They are subject to certain ingrained laws the same as our bodies. Our business is to keep away all binding grass and depredation. Where we have given them endearing names and allowed the children to call them their own—those who are older and know how to manage, should serve as guardians of this precious life-property, remembering it is as true in a moral as literal sense, that "just as the twig is bent the tree is inclined."

Arbor Day should be a reminder of public duty, the analogue of citizenship. How beautifully was it celebrated in Washington, D. C., on the 22d of April, 1893, by the employees of the Agricultural Department, assembled on the campus that is already an egeria of rural art. After a speech by Assistant Secretary Willetts, a white oak tree was planted in honor of Hon. J. Sterling Morton, the originator of Arbor Day, when Governor of Nebraska in 1872, now Secretary of Agriculture. Being called for a speech he responded as follows:

"It seems to be my fortune to have furnished to mankind a new sort of anniversary. All others up to the inauguration of Arbor Day treated of something that had passed away, and honored those who were dead. Arbor Day looks to posterity. The children in our schools should be taught the value of tree life as connected with all animal life, because we all understand that if there should be an intermission of a single summer's growth, and no foliage, flower or fruit came to the earth, when autumn dawned there would not be one single living, breathing animal on all this vast globe of ours. The inter-dependence of animal and vegetable life is constant, ever existing. Therefore, when we boast of our wonderful powers over all natural laws, all natural things and declare man's superiority to the vegetable kingdom, we must remember this victory of ours is only for a day, for tomorrow we die, and the roots and tentacles from this tree send down all these forces into the graves where we rest and our tired forms repose, in order to take up everything that there is of us materially and reconvert such to the use of the vegetable world.

"All the men standing about, all these hearts beating here today, only a few years since were parts of the vegetable kingdom, and only a few years hence we shall again be parts of flower, forest

and fruit. It is an endless, everlasting chain of cycles, in which we appear first in the animal and then in the vegetable world. It seems to me that a tree and a truth are the two longest lived things of which mankind has any knowledge. Therefore it behooves all men in rural life besides planting truths to plant trees; it behooves all men in public life to plant economic and political truths, and, as the tree grows from a small twig to a grand over-spreading oak, so the smallest economic truth, as we have seen in the United States, even in the last years, can so grow as to revolutionize the government of a great republic. I say then we should all plant trees and plant truths and let every man struggle, so that when we shall all have passed away we shall have earned the grand epiaph which we find in St. Paul's Cathedral in London. You remember Sir Christopher Wren? Wren was the architect of that wondrous consummation of beauty in building; and there among the heroic dead of England's greatest heroes upon land and sea repose his remains. On other tombs are marked words of eulogy, fulsome sometimes, always intense; but upon the sarcophagus where Sir Christopher Wren's remains repose is inscribed only these simple words; *Si quæris monumentam circumspice*—If you seek my monument look around you. So every man, woman and child who plant trees will be able to say, coming as I have come, toward the evening of life, in all cincerity and truth, if you seek my monument, look around you."

STATE BOUNTIES FOR TREE PLANTING.

The argument obtains, if such it may be called, that "It is inconsistent on the part of the State to pay a man for improving his own premises; that there is no more reason to pay him for planting trees than to pay him for subduing the sod on his farm and raising a crop on it." This opinion is endorsed even by some friends of forestry. It were irrefutable if trees sustain no broader relation to the public interest than plowing a piece of land or raising a crop of wheat.

BASIS OF EDUCATION.

The State educates the children. Is it inconsistent on the part of the State to pay for such improvement of the family or families? Socially, "we are members one of another." Socially, the children are or soon will be public possession. They are candidates for citizenship; hence the necessity of universal education at the expense of all the people. Though the parent owns the child, the State owns the child's influence, the child's character, and therefore assumes to regulate the child's or citizen's conduct.

The same rule holds true of trees. Though the bounty trees belong to the man who plants them, though he is specially benefited as he ought to be, yet the effects of the trees are

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